February Issue

The C.A.U.T. *Bulletin*

A Publication

Of The

CANADIAN ASSOCIATION

OF

UNIVERSITY TEACHERS

VOLUME 11 NUMBER 4
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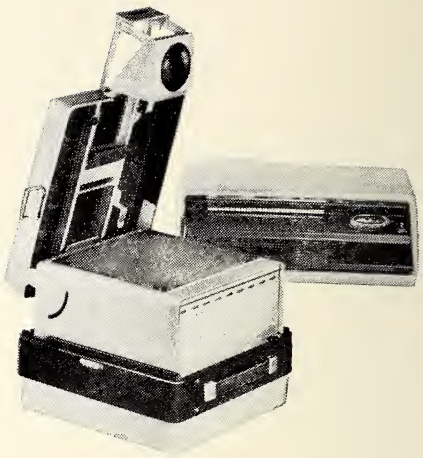
NEW VISUAL TEACHING AIDS HELP LECTURERS MAINTAIN CLASS INTEREST



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NOTHING TO LOSE BUT OUR BRAINS ?

An Editorial

The United States has long had an irritating habit of encountering basic Canadian problems first, and so putting us in the invidious position of appearing to imitate American solutions. This, not the least of the crosses that must be borne by the Canadian nationalist, is as true of university expansion as of anything else. Sooner or later, therefore, we may expect to encounter a suggestion made, no more than half ironically, by an American economist in 1959. This is that academics might take advantage of the heralded increase in demand for their services to regulate entrance into their profession. Medical associations, by just such a policy, have been able to improve both the standard of medical practice and the income of medical practitioners. They have also acquired a reputation for being more interested in the second of these objectives than in the first; but do we not show a lively and organized interest in salaries ?

The conspicuously successful professional associations have been able — so far — to get themselves accepted as guardians not only of their own but of the public interest in their fields. They have done so by a high degree of unanimity and of unquestioning self-confidence, which has enabled them to reap the benefits without accepting the label of craft unionism. The prospect of academics imitating them is remote and, if it were not remote, would be disturbing. The Ph. D. degree as a union card is already subject to criticism; think of the absurdity involved in requiring those whose graduate training has been done in other countries (nearly a third of faculty appointments in 1956-58) to obtain special Canadian or even special provincial certification. Practices of this kind are more likely to serve us as a warning than as an example; but it is wise to remember that the associations which resort to them have, in establishing a definite qualification for their members, also established a rough minimum standard of competence. The costs of achieving the same thing by anything

like the same methods are too high for an academic community to pay. They include a degree and kind of organization, a change in attitude and a suspension of individual judgement that would in themselves be a greater threat to academic quality than the present unregulated entrance into the profession.

The qualifications and competence of our future colleagues are however not things that Canadian academics can be complacent about. The recruitment of enough good faculty members is the most difficult of the problems raised by the current expansion of our universities; and it appears to be the one about which least is being done. In 1965-70 we will apparently need something like 15,000 new colleagues. Where will they come from and — more important — what will they be like ? About a fifth of new appointments have lately come from Canadian graduate schools, which are to be expanded not only absolutely but relatively. By 1970-71, according to a Canadian Universities Foundation projection, graduate enrolment will be 8.7% of undergraduate enrolment, whereas in 1955-56 it was 4.5%. No doubt it is possible to increase numbers very rapidly with no loss in quality; but considering our late start in mobilizing and applying the necessary resources, we will be lucky to avoid the common experience of finding it easier to multiply degrees than to multiply scholars.

In the United States, the same difficulty has led to a practice of using sow's ears without seriously pretending that they have been turned into silk purses. Of the couple of thousand American universities and colleges, some frankly constitute a sort of academic half-world, in which scholarship is expected only by those who do not know what scholarship is. There is no clear evidence for assuming that a much smaller country, with a much smaller scale of private benefaction to higher education, can afford to follow the same course. Yet, if we are content to drift, that is the easiest course to drift into.

The only present check on the quality of new academic appointments lies in the fact that our universities are more ambitious for scholarship than for size. In so far, and for

so long, as that *is* a fact, it is probable that no other check is desirable. But the policy of any university will reflect both the ideas of the men who control it and the pressures to which they are subjected. The pressures to increase in numbers are great, and nation-wide. Can faculty members maintain a compensating pressure for scholarly standards, without the active help of their own nation-wide organization ?

ON THE MATTER OF FREEDOM : THE UNIVERSITY AND THE PHYSICAL SCIENCES

by Alfred Schild*

It is the duty of a university to create knowledge and to pass it on to others.

Why create knowledge at a university ? A common answer is that a teacher in higher education who does not do research is likely to become stale and is unlikely to keep up with new developments in his field, so that the students will suffer. In the case of the physical sciences, there is a much better answer to the question. If universities had not created knowledge, there would be nothing there for universities to teach. Pythagoras and Euclid, Newton and Gauss, Gibbs and Einstein — all these men worked at academic institutions. (There are, of course, some isolated exceptions. Archimedes was perhaps the first and only great man of science to have thrived on government-sponsored research. His was a special circumstance ; the government was his cousin.) It is clear, then, that universities do have a very special duty to encourage research in the physical sciences. It is surely no accident that, on the one hand, money spent on industrial research or non-academic government research far outweighs all the money spent on universities and that, on the other hand, of the 131 Nobel prizes awarded in physics and chemistry, 116 have gone to men at universities and only fifteen to men working in industry.

*University of Texas. This article, first printed in that university's *Graduate Journal* (Fall, 1962), is also to appear in *Physics in Canada*.

Why has university research been so successful in the physical sciences ? A common answer is that universities stress basic research, whereas industry and government stress applied research. I believe that this is a poor answer. The terms "basic research" and "applied research" have been used and abused by so many different individuals, they have acquired so many distinct shades and levels of meaning, that they have now become almost completely meaningless. I much prefer the distinction between free research and channeled research.

Free research means that the scientist is free to follow his ideas wherever they may take him, that the only pressures exerted on the scientist are those generated from within. It is close to the truth to say that nowadays the only free research activity is found at universities, the term "university" being used in a broad sense to include academic centers which do not grant degrees, such as the Collège de France in Paris, the institutes for advanced study in Dublin and Princeton, and the Rockefeller Institute in New York. (The latter now does award degrees.)

Channeled research means that some restrictions from without are applied to the scientist's search. In industry or government the restrictions are applied by executives or managers and, under optimal conditions, are directed to the aims of research. The aims must be such that the possibility, in the near future, of practical applications can be foreseen. The applications must be those which prolong the life of man, which kill man, or which make money. Sometimes the restrictions are applied for moral or political purposes; the Catholic Church attempted to channel Galileo's research; it did not succeed, and Galileo's research remained free. The Communist Party of the U.S.S.R. attemped to channel Vavilov's research; it did succeed to the extent of killing Vavilov.

University research in the physical sciences is successful because some of it is free.

Why is freedom in research so important ? There are two interrelated reasons. The first is that great progress and large discontinuous jumps in our knowledge have always come from unexpected and unforeseen quarters. Fred Hoyle of Cambridge in a recent article in the New York *Sunday Times* gives an illustration of this which is essentially the following : Imagine an enlightened research director in the year 1885, with large financial means, with

well-equipped laboratories, and with good scientists whose work he can channel. Imagine that he and his board of directors agree that the main concern of the organization is to be the improvement of the methods of internal medicine. The research director arranges a meeting with his scientific advisers. At this meeting it is pointed out that a major problem in internal medicine is the difficulty of making proper diagnosis; internal organs are well hidden inside the human body and it is not easy for the physician to examine them. A unanimous agreement is reached that the research effort of the organization be concentrated in the development of new surgical tools for exploratory and diagnostic operations. In the next decade, knives, drills, and small optical devices of incredible delicacy are constructed. They enable a surgeon to cut into flesh and look for stones in a gall bladder, with only small permanent damage to the patient. Suddenly in 1895 a physicist, with little concern for the human gall bladder, plays with evacuated cathode-ray tubes and observes the presence of penetrating rays emanating from the glass wall of a tube. The physicist is Roentgen and he has discovered X-rays. It is hardly necessary to elaborate the sequel of events.

The second reason is the motivation which drives physical scientists and mathematicians to do their best work. This motivation derives directly, or indirectly by way of ambition, from a sense of esthetics. In this respect the physical scientist closely resembles the painter, the poet, or the composer of music. It may be true that the beauty of Faraday's force-line patterns or of Cantor's series of transfinite cardinals affects fewer men than the beauty of Utrillo's street scenes, of Goethe's *Faust* or Vivaldi's concertos, but it is beauty of the same kind. Even in popularity one might lay odds on Euclid or Bohr against Braque, Pound or Bartok.

It is the feeling of esthetic creation which is important to the scientist, not the possibility of the practical use of his ideas. Faraday and Maxwell would have shuddered at the thought of working towards the establishment of giant television networks which advertise and sell electric refrigerators. Rutherford would have shuddered at the thought of nuclear bombs.

I will quote three mathematicians whose lives span a period of twenty-five hundred years. According to Stobacus, "Someone who had begun to read geometry with Euclid, when he had learned the first proposition, asked Euclid, 'But what shall I get by learning

these things ?' whereupon Euclid called his slave and said 'Give him three-pence, since he must make gain out of what he learns.' " The famous nineteenth-century English mathematician (and Johns Hopkins professor) J. J. Sylvester was "almost tempted to say that one principal reason for the existence of space is that of feeding mathematical invention." G. H. Hardy was a pure mathematician of our own century. To qualify as pure, he said, a mathematical topic had to be useless; if useless, it was not only pure, but beautiful. If useful — which is to say impure — it was ugly, and the more useful, the more ugly.

Surely those three great men must have known that, whatever the similarities between music and mathematics, there does exist an important difference. Music almost never, and mathematics almost always, has technological applications. Surely those men would not have seriously believed that a beautiful mathematical structure suddenly and abruptly loses its esthetic beauty when an engineer discovers its convenience for his work. I believe that the revulsion against practical applications stems from a fear of losing some freedom in research. Hardy may have felt that any concern for applications would have channeled his work towards differential equations of ballistics and away from some other differential equations which he found more interesting.

There are, at present, dangers to free research at universities. The dangers are grave because once freedom of research has disappeared from our universities, there will be no haven left, it will have disappeared completely. Let me discuss some of the dangers as I see them.

The first comes from secrecy in scientific work and from government security measures. The danger to free research is obvious. The possible military advantages are often far from obvious. With great effort and ingenuity we hide from our own citizens scientific facts which we know the Russians know. I can easily imagine a world in which certain topics can be fully discussed only in secret conclave by scientists with the very highest security clearance, but where it does not matter in the least that some of these clearances have been granted by Washington and some by Moscow.

A second danger comes from vested interests at universities, from government contracts and other sponsored research on the one hand, and from large physical installations on the other.

Many American universities have come to rely on government contracts as their primary source of research support. Such contracts often lead directly to the channeling of research at universities. Pressure may be exerted on an individual to choose a particular research project merely because government money is available for its support. Sometimes the pressures are more subtle. A university may exert no pressure on a person to accept a particular government research contract; but when this person resigns his position, or retires, or dies, the university administration might well decide to replace him by someone whose interests happen to be closer to the areas where outside research support is available. Such channeling forces directed at a society rather than at an individual can in the long run be equally harmful. The mere writing of a research proposal may mean that present ideas exert pressure on future research. In theoretical work, where no assembling of complicated apparatus makes long-range planning necessary, the whole idea of a research proposal is preposterous. If one can tell ahead of time what one's research is going to be, the research problem cannot be very deep and may be said to be almost nonexistent.

The heart of a university consists of the men on its faculty and the books on its shelves. (I do not mention students because a good university will automatically attract good students.) It is pitiful to see some universities squander their resources on magnificent buildings which remain empty shells. Even large pieces of laboratory equipment — wind tunnels, electronic computers, and cyclotrons — bring dangers and should be feared. They represent large investments and can exert pressure on scientists to work on problems which use the monsters, and thus promise some return on the investment. This pressure, direct or indirect, is quite analogous to that of sponsored research projects. Even the writing of a research proposal has its analogue which can be illustrated by the following case history.

In 1946, Cecil Frank Powell of Bristol University, with simple tools (photographic plates, high mountains and microscopes) and through painstaking work, discovered the π-mesons; these particles serve as nuclear glue and produce the powerful nuclear forces which in turn produce atomic energy. A year later, Powell's Brazilian collaborator Lattes went to Berkeley and showed the Californians how to detect π-mesons produced by their cyclotron, at that time the most powerful particle accelerator running. It was then realized that even before Powell's discovery, the machine had been producing

π-mesons with an intensity one hundred million times greater than that of atmospheric cosmic rays — but no one had looked for them, no one had seen them. One of the reasons is perhaps the fact that precious time on such a machine must be parceled out to men who know beforehand what it is they are trying to see. (In fairness, it should be added that the discovery and clear-cut detection of anti-nucleons three years ago would in all probability have been impossible without the new 6BEV machine in Berkeley. The existence of these particles had, however, been predicted by the Dirac theory.)

A third danger comes from within the university organization. It comes from the measurement of human beings : giving grades to students, granting degrees, or counting the pages of a professor's publications. The measurement of man is self-defeating. It results in maximizing the measure and not that which it intends to measure. If a wrinkled forehead is ever accepted as a clear sign of a man's devotion to scholarly concentration, our campus lawns will swarm with empty-headed figures vigorously practicing frowns and other facial distortions.

I am often tempted to propose two far-reaching reforms : Every new-born child should receive, with his birth certificate, a second document granting him a Ph.D. This device would be quite inexpensive and it would result in students coming to a university to learn, and leaving the university whenever they felt that they had learned enough. All scholarly organizations should accept for publication in their journals only those papers where the author remains anonymous. This would result in fewer and better papers being published, those where the author (Anon., Ph.D.) has something of real value to communicate. It is true that such schemes would make it more difficult for industry to decide whether a prospective employee has the required professional qualifications. But it is not the purpose of a university to prepare its students for a profession. Such preparation is merely a by-product of scholarship and learning. It is true that such schemes would immensely complicate the task of deans and university presidents. But it is not the purpose of an administrator to make his own work as simple as possible.

The ideal university structure is not one with more democracy or more dictatorship than we have at present; it is one with more anarchy. It may be asked how a university can discover and punish those of its staff members who are lazy or unproductive. The answer

is this : It is better to have twenty staff members out of a hundred abuse their privileges, to have the other eighty doing serious work, to have seventy-nine of them struggle unsuccessfully with their problems, to have one man by good fortune make an important discovery, than to have twenty men fired and the other eighty busy producting large quantities of mediocre stuff. It may be asked how a university is to decide which men to hire in the first place. This question is difficult and I do not know the answer. I do feel that there must be better ways than those we use now.

The ancient professorial prerogatives of tenure and academic freedom contribute to anarchy in our university structures. Academic freedom and tenure are thought of largely in connection with the expression of unpopular political or economic views. In the physical sciences they are important for another reason : They generate freedom in research. This is so because tenure ensures a man's position and his living, whether his ideas are popular or not, whether his work lies parallel or perpendicular to the administrator's measuring stick. However, in these days of inflation, when a guaranteed dollar income has little value, tenure is often a rather tenuous privilege. The ideal scholar has a healthy contempt for money. He doesn't mind having it, but he refuses to work for it. Work is too serious a matter and is done for other reasons. But nothing is more effective than want in restoring a person's respect for money.

Having been asked to contribute an article, I have written a polemic. I have made no attempt to keep any balance, but have simply taken the opportunity to get off my chest notions which, to mix an anatomical metaphor, have long simmered at the back and the front of my mind. I have talked about my own fields, the physical sciences and mathematics. I would like to leave it to readers with interests in other areas to decide if any of the ideas apply elsewhere.

THE REPORT OF THE ROYAL COMMISSION ON HIGHER EDUCATION IN NEW BRUNSWICK: SUMMARY AND COMMENT

by R. A. Staal*

(I summarize the features of the report most likely to be of interest to members of the C.A.U.T. The original runs to 115 pages : omissions involve on the whole matters of mostly local interest, things the readers presumably know already or can conclude for themselves, and detailed considerations which do not lend themselves to summary or abstraction. Passages considered to be of special importance are quoted directly, and are so indicated.)

Terms of Reference

In May, 1961, the Province of New Brunswick appointed a Commission consisting of

Professor John J. Deutsch of Kingston, Ont.
Judge Adrien J. Cormier of Moncton, N.B.
and Doctor Robert W. Maxwell of Woodstock, N.B.

".... to make full inquiry and to make findings and recommendations ... respecting the whole field of higher education in the Province of New Brunswick ... including, but in no way restricting the generality of this reference ...

1) ... the relationship between the Provincial University of New Brunswick, the Government of New Brunswick and the various Church-supported universities.

2) The need for an institution of higher learning in the Saint John area.

3) The methods of dealing with student loans and scholarship programmes.

4) Any other related matters.

The Present Structure

The last such commission was appointed in 1854; it recommended a unified system of higher education centred in one non-sectarian University of New Brunswick, with affiliated denominational colleges. This was carried out in the sense that until recently Prov-

*University of New Brunswick.

incial financial support was given almost exclusively to the University of New Brunswick. It was not carried out in the sense that the Legisaltive Assembly chartered a number of independent sectarian degree-granting universities.

At present in the Province of New Brunswick (total population 597,936, of whom 329,940 are "of British origin" and 232,127 "of French origin") there are six universities plus five affiliated colleges. On the basis of the primary language of instruction and the mother tongue of the great majority of their students these may be classified as English-language institutions :

U.N.B.
Mount Allison
St. Thomas

French-language institutions : (to a considerable extent bilingual)

St. Joseph's

affiliates Notre Dame d'Acadie
Collège de l'Assomption
Séminaire Notre-Dame du Perpétuel Secours

Sacred Heart

affiliate Collège Jésus-Marie

Saint Louis

affiliate Collège Maillet.

To indicate the situations of the various institutions we use the following table, subsequently amplified.

The University of New Brunswick had its beginnings in 1785, was given a Provincial Charter in 1800 and became the University of New Brunswick in 1859. The chief governing body is a Senate, the majority of whose members are appointed by the Lieutenant-Governor in Council. A University Council, consisting of members of the faculty, deals with purely academic matters.

Mount Allison University originated in 1839, and was granted full degree-granting powers in 1858. Ownership is vested in the General Council of the United Church. The government is in the hands of a Board of Regents, consisting of 24 members appointed by the General Council of the United Church and 20 by the Mount Allison Federated Alumni. The Senate consists of the University faculty and 12 members appointed by the Board of Regents.

UNIVERSITIES AND COLLEGES IN NEW BRUNSWICK

Institution	*Location*	*Governed by (to be clarified)*	*Number of full univ. time students*	*Coeducat'l or not. Level*	*Prov. Grant '61 - '62 (% of operating income)*	*Operating deficit '61 - '62*
U.N.B.	Fredericton	Province	2200	Coed'l Undergrad. & grad.	$553,000 (37%)	$476,557
Mt. Allison	Sackville	United Church	1200	Coed'l undergrad.	$ 79,063 (8%)	$100,000
St. Thomas	Chatham	R. C. Church	200	Coed'l undergrad.	$ 15,813 (13%)	$ 32,000
St. Joseph's	Moncton	R. C. Church	588 (incl. affiliates)	Coed'l undergrad. grad. planned	$ 31,625 (7%)	$ 18,000
Notre Dame d'Acadie	Moncton	R. C. Church		Girls High school Undergrad.		
Collège de l'Assomption	Moncton	R. C. Church		Boys High school 2 years undergrad.		
Séminaire Notre-Dame	Moncton	R. C. Church		Boys High school 2 years undergrad.		
Sacred Heart	Bathurst	R. C. Church	162	Boys High school Undergrad.	$ 15,813 (10%)	$ 50,000
Collège Jésus-Marie	Shippegan	R. C. Church	27	Girls High school Undergrad.		
St. Louis	Edmunston	R. C. Church	160	Boys High school Undergrad.	$ 15,813 (8%)	$ 50,000
Collège Maillet	St. Basile	R. C. Church	40	Girls High school Undergrad.		

St. Thomas University had it origin during the 1860's and was granted full degree-granting powers in 1934. The University Corporation consists of the Bishop of Saint John and three other members of the University staff. These, together with at most 25 other persons, act as a Board of Governors, which selects the president and faculty, in whom control of academic matters is vested.

St. Joseph's University was founded in 1864. In 1868 it was incorporated and accorded full degree-granting powers. At first located in Memramcook, operations (for university-level work) were gradually transferred to Moncton. The University is owned by the Holy Cross Order which provides from among its members a small Board of Governors. The Board appoints the president and faculty who (subject to the Board's approval) control all academic affairs. In 1961 steps were taken to establish a Board of Regents, with representation from outside interests to serve for the time being as advisers to the Board of Governors. The three affiliated colleges are independent financially, but are subject to University approval of academic standards. Federal and Provincial grants, are, however, distributed in proportion to college-level enrolments at all four institutions.

Sacred Heart University was founded in 1889, and was granted full university powers in 1900. It is a corporation consisting of members of the Eudist order. Members of the corporation serve as a Board of Governors with control over both business and academic affairs. The affiliated Collège Jésus-Marie is financially independent, the affiliation agreement being limited to academic matters.

St. Louis University had its beginning in 1943, when it was agreed with diocesan authorities that the Eudist order would establish its second college in New Brunswick at Edmunston. In 1947 full degree-granting powers were authorized. Its form of government, and form of affiliation with Collège Maillet are the same as that of Sacred Heart University and Collège Jésus-Marie.

Student Numbers

In 1956-57 the percentage of the age group 18-21 in New Brunswick attending University full-time was 7.6. The figure for all of Canada was 8.7. By 1961-62 the New Brunswick percentage rose to only 8.6, while that for Canada became 12.2.

Enrolment at the three English-language universities during the same period increased by 59%, compared with 72% for the French-language institutions.

In 1961-62, approximately 3500 New Brunswick residents attended universities both inside and outside the Province, while the total enrolment at New Brunswick institutions was 4,573. Thus there was a net inflow of about 1,100 students.

The following table indicates the growth pattern since 1956.

	Enrolment in 1961-62		*Increase since 1956*	
	Total	*Outside Students*	*Total*	*Outside Students*
U.N.B.	2,170	1,108	893	659
Mount Allison	1,219	923	302	243
St. Thomas	199	18	125	15
St. Joseph's	588	131	288	49
Sacred Heart	189	71	77	28
St. Louis	208	76	48	21
Total	4,573	2,327	1,733	1,015

By 1970-71 the projected enrolment will be at least double that at present.

Problems and Deficiencies

1. Duplication and Dispersion

"... it appears that the existing universities and colleges are not yet in a position to serve adequately even their present student body.

"The University of New Brunswick... and Mount Allison... together form a firm basis for development of fully adequate facilities of higher education for a large segment of the Provinces's English-speaking population... On the other hand, St. Thomas... is still in a preliminary stage of development... The further development required... would involve serious duplication of... facilities... already available for English-language institution... it seems imperative... to take advantage of those facilities which already exist.

"Without in any way wishing to detract from what has been accomplished... the Commission is compelled to emphasize that the existing French-language institutions are severely handicapped in implementing even their present programmes. The library resources now available at some of these institutions... do not compare favourably... with serious personal collections. Similarly, laboratories for science instruction fail even to meet the standards existing in larger high schools in the Province... It is evident that further Provincial government assistance could lead to costly proliferation if the eight universities and colleges... continue to operate without

any meaningful coordination of their activities. The necessary improvement of higher education for the Province's French-speaking residents can be expected to flow not from continued dispersion, but rather from a very considerable concentration of efforts."

2. Operating Problems and Deficiencies

"The Commission considers that federal government support will be unlikely to yield sufficient annual income for general operating expenses in the immediate future . . . One of the main defects in the present federal operating grant is the provision that the amount allocated for each province increases only with the total population rather than with university and college enrolment . . . In New Brunswick, total population grew by only 8% between 1956 and 1961, while there was an increase of 60% in total enrolment.

"The formal Provincial operating grant to the University of New Brunswick increased by about $100,000 between 1956-57 and 1961-62, but the total operating support (. . . including deficits absorbed by the Province) grew by approximately $600,000."

The following table gives the Provincial operating grants on a per student basis.

	1956-57		*1961-62*	
	Per Student	*Per N.B. Student*	*Per Student*	*Per N.B. Student*
U. N. B.	$347	535	482	985
Mt. Allison	69	265	65	267
St. Thomas	171	178	79	87
St. Joseph's	84	116	54	69
Sacred Heart	113	183	84	134
Saint Louis	79	120	76	120

3. Buildings and Equipment

ESTIMATED CAPITAL EXPENDITURES AND INCOME NEW BRUNSWICK UNIVERSITIES 1956-57 THROUGH 1961-62

	U.N.B.	*Mount Allison*	*Saint Thomas*	*Saint Joseph's*	*Sacred Heart*	*Saint Louis*
			(thousands of dollars)			
Expenditures :						
Academic, administrative and general services	4071	1287	250	37	124	252
Residential, recreational and misc.	2993	2196	483	860	673	—
Estimated amounts to complete projects under way	1731	2323	—	—	—	—
Total	8795	5806	733	897	797	252
Income (Capital) :						
Federal (incl. Canada Council)	776	505	49	230	73	99
Province of New Brunswick	2700	105	—	—	—	—
Church Support	—	14	531	—	—	—
Business Corporations	1571	1016	36	—	62	—
Individuals	485	1669	17	—	13	140
Borrowing	792	440	100	650	624	—
Total	7064	3749	733	906	787	239

4. The Level of Present Provincial Government Support

"It is clear that Provincial Government support for New Brunswick's universities and colleges has become progressively more inadequate during the past six years. Although there have been substantial contributions toward capital projects at the University of New Brunswick, there has been virtually no assistance for the improvement of physical facilities at the Provinces' five other universities. At the

same time, the University of New Brunswick has not been able to maintain its operating resources at an adequate level, while the other institutions in the Province have actually experienced declining per student revenue for their instructional activities.

"... Consequently the regular Provincial grant for the University of New Brunswick now fails completely to reflect the assistance required to maintain even the existing level of services : for 1961-62 the University's estimated deficit of $493,000, which will have to be absorbed by the government, is equivalent to 89% of the regular grant.

"... New Brunswick's cash grants in 1961-62 were, at best, only about one-half the amount required to reach a level which is comparable to that sustained in the country as a whole."

Provincial Government Grants to Universities and Colleges, New Brunswick and All Provinces

	'56-'57	'57-'58	'58-'59	'59-'60	'60-'61	'61-'62 (est.)
GRANTS($) PER FULL-TIME STUDENT ENROLLED IN PROVINCE						
New Brunswick	212	290	277	268	324	345
All Provinces	441	678	653	803	965	1036
N.B. as % of All Provinces	48	43	42	33	34	33
GRANTS AS % OF PERSONAL INCOME						
New Brunswick	.12	.18	.17	.17	.21	.24
All Provinces	.15	.25	.24	.31	.40	.47
N.B. as % of All Provinces	80	72	71	55	53	51

The Adequacy of Student Aid

This is an important item, but one which we will touch on lightly in this summary. We confine ourselves to two tables which show a notable difference between New Brunswick and Canada as a whole.

PROVINCIAL STUDENT AID PER HEAD IN AGE GROUP 18-21. 1957-58 TO 1961-62

(*Teacher-trainers enrolled at universities excluded*).

	All Provinces	*New Brunswick*
1957-58	$2.51	.44
1958-59	3.82	.43
1959-60	6.61	.40
1960-61	8.18	.39
1961-62	—	4.92

ESTIMATED DISTRIBUTION OF PROVINCIAL AWARDS OF STUDENT AID

	All Provinces 1960-61	*New Brunswick 1961-62*
Scholarships	19%	4%
Bursaries	49	4
Loans	32	92%

Recommendations of the Commission

(We quote directly from the Report. To make for easier reading we leave out the "..." 's.)

"The need to expand the Province's university and college facilities must be considered as urgent. However, the problem involves more than merely adding to total facilities. It will also be necessary to serve various groups of students. Although two of every five New Brunswick residents are French-speaking, there have been only tentative beginnings toward the establishment of scientific, professional and other specialized instruction in the French language. Even within the liberal arts the facilities are less adequate than those provided for most English-speaking students.

It has been suggested that an appropriate future policy would be to continue effective assistance for only the University of New Brunswick, with sufficient student aid to enable all academically qualified students to attend that institution. However, despite nearly 175 years of virtually exclusive support for the Provincial University, its share of French-speaking students remains very small. Failure to provide French-language facilities elsewhere would not be likely to draw additional French-speaking students to it.

However, if it is necessary to maintain adequate facilities beyond those of the University of New Brunswick, the danger of dispersion makes it difficult to visualize wider support on the basis of the present framework.

At present no fewer than three universities and five affiliated colleges are attempting to develop French-language instruction without benefit of any meaningful coordination of activities.

Continuation of present academic policies by the University of New Brunswick and Mount Allison will be most unlikely to lead to serious duplication. The future development of St. Thomas, however, would require considerable duplication.

The absence of reasonable facilities in the densely populated Metropolitain Saint John area (pop. around 90,000) is illustrative of

dispersion of effort in the Province. At present the only significant post-high school programme in the area is "Grade 13" instruction provided at Saint John High School. The Commission has had full advantage of the very considerable research undertaken by members of the Saint John College Development Corporation, nevertheless recent experiences have not given the Commission the required enthusiasm to recommend the chartering of yet another independent institution in New Brunswick at this time."

To provide a framework within which the Province may meet present and future needs without wasteful duplication and dispersion of effort, the Commission recommends :

(a) consolidation of the existing French-language institutions into a single university organization

(b) transfer of St. Thomas Unversity to the University of New Brunswick campus in Fredericton

(c) establishment of a branch of the University of New Brunswick in the Saint John area.

The following tabulation summarizes some further details of the recommendations.

University organizations (academically independent)	*Institutions with administrative autonomy (e.g. staff appointment, finances)*	*Location of campus*	*Annual Operating Grant ($1000)*	*Capital Grant 1962-67 50% of total cost ($1000)*
U. N. B.	U. N. B.	Fredericton Saint John	800	2750
St. Thomas (B.A., B.Ed. only)	St. Thomas	Fredericton		
Mount Allison	Mount Allison	Sackville	150	650
University of Moncton		Moncton	200	1500
	St. Joseph's	"		
	Notre Dame d'Acadie	"		
	Collège de l'Assomption	"		
	Séminaire Notre-Dame	"		
	Sacred Heart	Bathurst	25	300
	Collège Jésus-Marie	Shippegan		
	St. Louis Collège Maillet	Edmundston St. Basile	25	300

In addition, there are to be annual grants per New Brunswick resident enrolled for full-time study toward university degrees as in the following table :

Academic Year	*Grant per Student*
1962-63	$ 300
1963-64	330
1964-65	360
1965-66	390
1966-67	420

Specific recommendations are made concerning the form of government of the new University of Moncton, which is to be the sole degree-granting French-language institution, to which the existing French-language Universities shall be affiliated as Colleges.

1. Executive powers shall be vested in an Administrative Council composed of seven members appointed by the Holy Cross order, who shall manage the business affairs of the University and, upon recommendation of the President, shall appoint academic staff members for the University proper.

2. The University shall have a Board of Regents composed of :

   a) Ex-officio members : the Archbishop of Moncton, the Provincial of the Holy Cross Order, the Provincial of the Eudist Order, the President, the Chairman of the Administrative Council, the Bursar of the University and one other representative of the Roman Catholic Church.

   b) Six members appointed by the Administrative Council.

   c) Six members elected by the alumni association.

   d) One representative of each of the affiliated Colleges.

   e) One additional representative, who shall be a lay person, from each of Sacred Heart and Saint Louis.

   f) Twelve members to be appointed by the Board of Regents and to include representatives of the various French-speaking regions of the Province.

3. The University shall have an academic board or Senate, composed of the President, Vice-President, Registrar and appointed and elected representatives of academic bodies within the University.

The branch of the University of New Brunswick to be established in Saint John shall "offer immediately the full first two years of the University's regular degree programmes in arts and science, with further development as justified by requirements and the availability of adequate resources.

In general, the Commission recommends that :

1. "Apart from ... the University of Moncton ... the Legislative Assembly adopt as firm policy the establishment of no additional degree-granting institutions."

2. Mount Allison University continue, for the foreseeable future, its announced policy of development as an undergraduate liberal arts college of limited enrolment.

3. Apart from the branch in the Saint John area, no additional colleges, branches or other agencies offering college-level work be authorized by the universities of New Brunswick until such developments are clearly demonstrated to be both necessary and feasible. The Commission anticipates that there is not likely to be such a requirement for at least ten years.

Comments on the Report

So far there has been little public response to the Commission's Report, the only conspicuous reaction being the determined opposition of a group of citizens of the Chatham area to removal of St. Thomas University to Fredericton. There has been some opposition expressed to the possible division of teacher training (at present carried on in a successfully bilingual manner in Fredericton) into two separate groups, one in Fredericton and the other in Moncton. The Report leaves the way open for such a split, without specifically recommending it at this time.

Privately, it has not been too hard to get reactions. It is agreed by all that the Commission had an unenviable task, having to deal with an intricate and highly unsatisfactory situation.

Approval has taken the form of recognition of the Report as a realistic appraisal of the existing situation and of the wishes of the various sections of the population. Particular attention has been paid to the almost total failure of the Province through virtually exclusive support of U.N.B. to provide adequately for its French-speaking citizens.

Opposition, as is usually the case, has been much more detailed and specific, and we will report only on what seem to be the major issues.

It is felt by some critics that the Commission did not go far enough in dealing with the rather obvious problems of dispersion, the degree of effective consolidation provided being very uncertain. There are to be 4 "academically independent" institutions, 11 "administratively independent" institutions and 8 different campuses, serving a population of around 600,000.

Some still feel that providing facilities in both languages at U.N.B. would have been best : that, although (to quote the Report) "failure to provide adequate facilities elsewhere would not be likely to attact French-speaking students to U.N.B.", it is possible, and indeed likely, that success in providing such facilities might have such an effect.

Attention has been called to the anomaly in having a number of provincially-supported (to an extent roughly corresponding to student numbers and the cost of various types of services) institutions, one of which has the majority of its Senate (i.e. Board of Governors) appointed by the Province, and the others being sectarian instiutions entirely free of direct government control. It is felt that, considering recent developments in the Province of Quebec, and notwithstanding the differences between the French-speaking populations in the two neighboring Provinces, the Commission has made an unnecessary major decision, and done so without any attempted justification.

The Report has been criticized for the emphasis which it puts in various sections on groupings of students. Even for English-speaking students, U.N.B. is referred to as "providing facilities for *most* of these" (the italics are ours). The question of what grounds, be they of language, religion, numbers, geographical location or others, make it advisable to split off a group of students and provide them with separate facilities, with all that these involve, is not faced or

discussed directly : yet it has a great deal of bearing on the Commission's recommendations. Apart from the need for a great deal of expansion in French-language instruction, which has been glaringly obvious for many years, this is a most difficult question to deal with. Yet it is of central importance to our situation here in New Brunswick, and there were many who hoped that the Commission would deal with it more fully.

Some have objected to the Commission's apparent preference for a scheme in which "professional, specialized and advanced" instruction must be very highly concentrated, but in which undergraduate education in the liberal arts may be carried out at a number of smaller institutions. The reasons seem to be linked with the cost per student, but this is not felt to be the only factor involved in the issue of concentration. There are those who feel that it is precisely in the liberal arts that the educational advantages in bringing together a sizeable community of students and staff with differing backgrounds are greatest. It is also felt that there is an unfortunate tendency to emphasize too exclusively the relative strength of "professional specialized and scientific" work at U.N.B., whose position in the liberal arts is equally strong in the Province.

Recent Developments

The general framework of institutions suggested in the Report has been accepted by the Province. The proposed move of Saint Thomas University to the University of New Brunswick has been left "as an ecclesiastical decision" to the former institution to decide. Finally, the major features of the financial recommendations have been adopted.

THE STUDY OF STUDENT-STAFF RATIOS AT THE UNIVERSITY OF BRITISH COLUMBIA

by J. A. Crosse*

In 1960 the Committee on Academic Standards of the Faculty Association at U.B.C. accepted the responsibility of acting as a C.A.U.T. committee for the study of teaching loads, student-staff ratios and similar problems. This article is intended to inform members of the work of this committee to date and to encourage them to make similar studies in their own departments so that factual comparison between departments of a similar nature at different universities in Canada may become possible.

Most readers will no doubt be aware of the critical problem of staffing the universities and colleges of Canada in view of the rapidly increasing enrolment. This requires a constant vigilance in order to ensure that the ratio of student to staff and the teaching load per staff member do not get out of hand. The ratio of student to staff can be interpreted as the degree of competition the student has to face to gain the attention of his instructor or conversely the amount of attention the instructor can devote to a particular sudent.

The teaching load, although having little meaning when comparing the work of two individuals, becomes more significant when averaged over all staff members within a department. Other figures which merit attention are the proportion of junior, senior and graduate students ,number of courses, class sizes, etc.

Examination of the problem has usually resulted in overall average figures for a whole university being compared with figures of other universities, presumably by a process of counting of heads which introduces some sizeable errors unless there is scrupulous attention to methodology. It is obviously necessary to tackle this problem in considerably greater detail than such a cursory examination.

Our approach at U.B.C. has been to start at the bottom and work up. Information on teaching commitments is collected from individual faculty members. We started with a mail questionnaire which tried

*University of British Columiba.

to obtain information not only on teaching but also on preparatory and follow-up work, administrative duties, research and professional activities. We found this unsatisfactory because of the highly subjective nature of the replies and the incompleteness of returns. This in spite of its recommendation by the American Council on Education[1]. One alternative method of establishing how a university professor spends his time is that evolved by Ritchey[2]. In this he uses a sampling technique to determine activities and time. This technique makes the analysis far more objective but has the disadvantage that the observer or sampler will probably have to be a member of faculty in order to obtain the co-operation of the department under study.

At U.B.C. we have contented ourselves for the moment in excluding all except scheduled teaching time from our considerations. We recognize that this is not entirely satisfactory but at least it helps to get away from information of a very subjective nature. After various trials in previous years we experimented in the academic year 1961-62 with the procedure outlined in this report. We recognize that it is not completely satisfactory but we put it forward to members as a means of stimulating discussion on the subject. It must be recognized that such comparisons are a two-edged sword. They can be used to benefit or restrict the department they claim to portray.

There will be few who criticize the benefits they are likely to give. For instance, they may be used to :

1. Emphasize current or emerging problem areas within departments. For instance, the wide difference in the amount of junior and senior work in service departments, e.g., English, Mathematics, etc. or the small contact that the average arts major (as opposed to the honours student) can have with his instructor.

2. Encourage discussion of the various methods of reducing these problems by different forms of organization, section size, use of part-time or student assistants.

3. Assist in planning, e.g., assessing the effect of increasing enrolments, development of graduate programmes, etc.

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[1] J. E. Stecklein, *How to Measure Faculty Work Load* (American Council on Education : New York, 1961).

[2] J. A. Ritchey, "An Unusual Work Sampling Application", in *Journal of Industrial Engineering,* X (1959), 6.

4. Provide a basis for comparison with similar departments at other universities, e.g., between, say, U.B.C. English Department and the English Departments at Toronto and McGill.

They may however also be used by the administration to limit or restrict the development of a department by the argument that it is already favourably placed with regard to staff as compared to a department with a higher student-staff ratio or teaching load. There will be those who argue that these comparisons are dangerous and should therefore be suppressed. Against this it must be recognized that whether we like it or not comparisons will be made. Figures of staffing and enrolment are easy to come by. It is in everyone's interest that comparison should therefore be made with full regard to all relevant information. This can best be achieved if comparison is made on a uniform basis by someone fully informed about the organization of the department concerned. It has been the aim this past year to develop a uniform methodology from study by members of the Committee on Academic Standards in their own departments. The analyses made to date are therefore appended for comment and discussion.

Statistics and Methodology

The sample statistics for the departments of Chemistry, English, Geography, Mathematics, and History, and the Faculty of Commerce are appended at the end of this report together with some notes on methodology.

We have endeavoured to express the student load on a department in terms of the *equivalent full-time student.* Raw data from registrar's figures do not consider number of hours per week in lectures and laboratories average student load or number of courses taken in other departments (see Appendix I for the method of computing this figure and Appendix II for examples of its application).

Similarly the widespread use of part-time staff or staff who teach in two departments requires expression in terms of equivalent full-time staff. As the load on a full-time staff member varies from department to department, adjustment must be made in terms most applicable to that department.

We have made these calculations separately for the various levels of instruction because we feel that interpretation is more useful when made between comparable levels of instruction. We have also diffe-

rentiated between departments providing instruction predominately by lecture and departments like Geography and Chemistry where the proportion of laboratory time is appreciable.

Interpretation

Because the Committee has primarily concerned itself with the development and testing of an acceptable method for the computation of these ratios there has been little opportunity for discussion of the significance of the results. However, a preliminary examination of the figures for six of the departments represented on the Committee raised a number of questions :

1. To what extent may these data be used for comparative purposes ?
2. What are optimum student-staff ratios for (a) lectures, (b) laboratories, (c) discussion groups in both junior and senior years ?
3. To what extent is the recruitment and holding of staff (apparently so urgently needed as a *result* of high student-staff ratios) limited by the prospect of the conditions their appointments are intended to alleviate ?
4. What are the results of large student-staff ratios upon the staff and course structure of the departments concerned ?
5. To what extent are some students penalized by having to spend a good deal of their time in courses (or fields) with high student-staff ratios by comparison with others who select courses or fields which permit greater contact with their instructors and less competition for library material or laboratory facilities ?

On the basis of relatively brief discussions of these questions, the Committee concluded that the method of computing student-staff ratio is sufficiently refined to report the results to the C.A.U.T., to embark upon comparative studies between similar departments in other selected Canadian universities and to commence regular annual studies for a wider selection of departments in this university. Inter-departmental comparisons should be undertaken only with discretion and a full appreciation of the variety of factors involved. The Committee would not, for example, consider that an average student load of 18 units in Chemistry is *necessarily* heavier than a load of 16 units in History, or that teaching responsibilities of 9.6 hours in Geography are *necessarily* heavier than 8.3 in History.

In respect to some of the other questions the Committee concluded that excessive student-staff ratios do exist in some departments with the result that (1) only very limited personal contact between student and faculty is possible, (2) in some departments there is already a 'junior division' composed of staff whose academic training is incomplete, (3) responsibilities associated with large classes and decreased opportunities for research do constitute a deterrent to recruiting new staff.

APPENDIX I

Methodology for Computing Student-Staff Ratio

1. *Enrolment*

   The figures of enrolment were from Registrar's Class lists, actual counts, or Christmas Exams. Greater uniformity of source would be necessary on subsequent studies.

2. *Student Hours*

   Enrolment x number of hours required in lectures and laboratories per week.

3. *Average Student Load*

   In some departments, this is a clearly defined quantity. In others, it varies appreciably and special measures are needed to assess it. (See notes for each department). The load may be different for different levels. In some departments, one hour of labs is considered to be equivalent to two hours of lectures.

4. *Equivalent Full-time Students*

   Obtained by dividing the number of student hours by the number of hours required by the department. (Item 2 divided by item 3).

5. *Courses*

   The number of courses offered in the two terms irrespective of the number of hours per week.

6. *Sections*

   The number of sections into which students are divided.

7. *Staff Hours*

   The total number of lecture and lab hours for which the teaching staff are responsible. In some departments, there is the need to show separate figures for demonstrator or assistant hours.

8. *Average Full-time Staff Load*

   Consider only those who teach a full load in the department, i.e., excludes departmental heads (where their load is reduced), research professors, part-time lecturers, and teaching staff who also teach courses offered by other departments.

9. *Equivalent Full-time Staff*

Staff hours divided by average full-time staff load. (Item 7 divided by item 8.) This hypothetical figure indicates the number of staff required assuming all staff carried a full load.

10. *Average Section Size*

Enrolment divided by number of sections (item 1 divided by item 6).

11. *Student/Staff Ratio*

The equivalent full-time student (item 4) divided by the equivalent full-time staff (item 9).

Notes

Some variation of methods are apparent in the preliminary studies in Appendix I. For instance, should thesis and essay work be included ? What is the conversion rate between lectures and labs ? What constitutes a course ? What constitutes a section ? Although uniformity of methodology is desirable, some latitude is necessary to permit departments to express their statistics in the most meaningful manner.

APPENDIX II

Student-Staff Ratio Studies for the Departments of Chemistry, English, Geography, Mathematics, History and the Faculty of Commerce.

CHEMISTRY

Statistics — September, 1961 **Prepared by C. Reid**

	Year	*1 & 2 Arts & Science + 1 Engineering*		*3 & 4 Arts & Science 2, 3, & 4 English*		*Total Undergraduate*		*Graduate*
		Lectures	*Labs.*	*Lectures*	*Labs.*	*Lectures*	*Labs.*	*Lectures*
1.	Enrolment	3132	3085	1236	1019	4368	4104	203
2.	Student hours	8365	10,040	3134	3108	11,499	13,148	294
3.	Aver. Student Load	See note						5
4.	Equiv. Full-time Students	542	509	201.8	184.5	743.8	693.5	59
5.	Courses	7		15		22		18
6.	Sections	29	41	22	26	51	67	18
7.	Staff hrs.*	77F	132F 351D	53.5F	85.5F 108.5D	130.5F	217.5F 459.5D	23F
8.	Av. Full-time Staff load	11		11		11		6
9.	(a) Equiv. full-time Staff ex. dems.	19		12.64		31.64		3
	(b) Equiv. full-time Staff incl. dems.	51		22.5		73.4		3
10.	Av. Section (size)	108	75.3	56.2	39.2	85.8	61.3	11.3
11.	(a) Stud./Fac.	27.62		15.3		22.7		19.7
	(b) Stud./Fac. demons.	10.3		8.6		9.78		—

*F - Faculty, D - Demonstrator

Notes : (Numbers refer to row in table).

3. Equivalent full time students. Eighteen units are assumed. This is *not* 18 hours of lectures or of lab. The method used is shown by the following example.

   First and second years. The 21 units given add up to 18 lectures and 23 hours of lab.

   . '. An 18 unit student averages.

   $\frac{18}{21} \times 18 = 15.43$ hours of lectures and $\frac{18}{21} \times 23 = 19.72$ hours of lab.

   Total student hours are divided by these numbers to get equivalent full-time students based on lectures and labs separately. The two are not identical because a certain proportion of "repeaters" are excused lab.

7. Staff involvement. Labs and lectures are simply added to give total faculty hours. Labs are usually run with one faculty member in charge plus several graduate assistants demonstrating. The full lab. hours have been counted, i.e., no attempt has been made to equate say 2 lab hours with 1 lecture hour.

8. Average Full-Time Staff Load. All faculty excluding the Department Head have been included, and the average faculty load (lectures + labs) is very close to 11.0 hours. The equivalent full time is then total staff involvement (lectures + labs) 11.

   To include a measure of the graduate student involvement the same index (11 hours) has been used to get a full-time graduate student help figure. The 11 hours is in fact less than we ask of a "full-time" graduate assistant (one with no course commitments) but considerably more than the average graduate student actually spends demonstrating.

   The fourth year 3 unit thesis has been considered as a 3-3 subject, since both theory and lab time are involved. Although, therefore, students doing this course are included in the enrolment (lecture and lab) row it is not possible to include a figure in the "number of sections" or Teaching Demands row. The latter is clearly *not* zero but since I cannot assess it, it seems simpler to exclude it both from the teaching demands *and* from the faculty load estimate.

Special Considerations :

1. A detailed breakdown in terms of honours and majors is not possible. However, Chemistry honours enrolment in 3rd and 4th years is only about 60.

2. This is a predominately research department.

3. No figure is included for graduate lab hours because of the difficulty of assessment.

ENGLISH

Statistics — December, 1961 **Prepared by E. B. Gose**

	Year	*1 & 2nd Years*	*3rd & 4th Years*	*Total Undergraduate*	*Graduate*
1.	Enrolment	6,493	2,105	8,598	73
2.	Student hours	22,438	5,870	28,308	206
3.	Aver. Student load	16.5	16.5	16.5	6
4.	Equiv. full-time students	1,355	356.6	1,711	34.3
5.	No. of courses	3	30	33	10
6.	No. of sections	157	47	204	10
7.	Staff hours	549	146	695	23
8.	Aver. full-time staff load	11 (approx.)	9	—	9
9.	Equiv. full-time staff	49.9	16.2	66.1	2.5
10.	Aver. section size	41	44.7	42	7.3
11.	Student/staff ratio	27	22	26	13.7

Notes : (Numbers refer to row in table).

3. Student Load : The average load of undergraduates was assumed to be 16.5 units (halfway between the minimum of 15 and the maximum of 18). The average load of graduate English students is 6 units (many teach). Headings 1-5 of General Statistics include the thesis courses : 449 (17 enrolled), 549 (13), 649 (2). Also the honors reading course, 446 (42). Since these courses do not have an instructor, they were not counted under heading No. 7.

8. Average Full-time Staff Load : The teaching load of full-time members teaching "3rd and 4th year" courses and "Grad" courses is 9 hours per week. Since freshman English is a 4-hour course (with 2 sections taught by some full-time members and many sections taught by teaching assistants), that course (93 sections) brought the average of the teaching load in "1st and 2nd years" up to 11 hours per week approximately.

Special Considerations :

1. The Department of English has 43 honors students but only 3 special courses for them. They are, therefore, simply counted in with other students under "3rd and 4th years."

2. Evening courses given for credit are omitted.

GEOGRAPHY

Statistics — Christmas, 1961 **Prepared by J. D. Chapman**

Year	*1st & 2nd Year*		*3rd & 4th Year*		*Total*	
	Lecture	*Lab/Disc.*	*Lecture*	*Lab/Disc.*	*Lecture*	*Lab/Disc.*
1. Enrolment	1,097	1,097	782	475	1,879	1,572
2. Student hours	3,291	2,011	2,300	598	5,591	2,609
3. Equiv. full-time students	321.3		175.6		496.9	
load	16.5		16.5		16.5	
4. Aver. student						
5. Courses	2		13		15	
6. Sections	5	37	14	16	19	53
7. Faculty hours	15	67F 67A	39.5	21.5F 21A	54.5	88.5F 88.5A
8. Aver. full-time faculty hrs/wk	19.6		19.6		19.6	
9. (a) Equiv. full-time faculty	4.2		3.1		7.3	
(b) Equiv. full-time staff (incl. A)	18.9		7.8		26.7	
10. Aver. section size	219.4	29.6	55.8	29.7	98.8	29.7
11. (a) Student/ faculty ratio	76.5		57		68.1	
(b) Student/ staff ratio	17		22.5		18.6	

F = Faculty A = Assistants.

Notes: (Numbers refer to row in table).

4. Average Student Load : 16.5 hours per week is considered a reasonable figure to take for all four years on the basis that each year will contain one course with laboratory or discussion periods.

8. Faculty Hours : Total lecture and lab/discussion hours for which the faculty are responsible.

9. (a) Equivalent full-time Faculty : Faculty only.
   (b) Equivalent full-time Staff : Faculty *plus* equivalent full-time assistants. An average assistant is employed in lab/discussion periods for 4.6 hours per week.

No figures are yet available for graduate students in this department.

MATHEMATICS

Statistics — March, 1961 **Prepared by R. A. Restrepo**

Year	1st & 2nd Arts 1st Engineering	3rd & 4th Arts 2nd, 3rd, & 4th Engineering		Undergraduate Total	Graduate
			Major Honours		
1. Enrolment	4,990	1,530	451	6,971	68
2. Student-hours	16,168	4,286	1,058	21,512	96
3. Aver. student load	18	18	18	18	12
4. Equiv. full-time students	898	238	59	1,195	8
5. No. of Courses	11	10	15	36	9
6. No. of Sections	85	24	17	126	9
7. Staff-hours	286	67	40	393	17
8. Aver. full-time staff load	9	9	9	9	9
9. Equiv. full-time staff	31	7.5	4.4	42.9	1.9
10. Aver. section size	59	64	26	55	7.6
11. Student-staff ratio	28.4	31.4	13.4	28	4.2

Notes : (Numbers refer to row in table).

3. Student Load : An average load of 18 units was assumed for undergraduate students, and a load of 12 units (besides thesis work) was assumed for graduate students.
2. Student Hours : In courses where the number of lectures differs from the number of credit units, the number of lectures was used in the table.

Special Considerations :

1. Mathematics courses given for students in Applied Science were grouped with courses in the Faculty of Arts and Sciences requiring the same level of preparation.
2. Honours courses include courses restricted to students in Honours Math. and/or Physics and/or Chemistry, and the corresponding courses in the Faculty of Applied Science.
3. Graduate courses do not include thesis or supervised reading.

HISTORY

Statistics — November, 1961. Registrar's Class Lists **Prepared by P. Harnetty**

Year	1st & 2nd Years	3rd & 4th Years	Total Undergraduate	Graduate
1. Enrolment	2,067	534	2,601	7
2. Student-hrs./wk.	6,734	1,545	8,289	17
3. Aver. student load	16	16	16	16
4. Equiv. full-time students	421	96.5	518	1
5. No. of courses	5	19	24	2
6. No. of sections	11	19	30	—
7. Staff-hrs./wk.	41	69	110	11
8. Aver. full-time staff load	8.3	8.3	8.3	8.3
9. Equiv. full-time staff	5	8.3	13.3	1.3
10. Aver. section size	188	28	87	—
11. Staff-student ratio	84	11.6	39	0.77

Notes : (Numbers refer to row in table).

3. Average student load varies between 15 and 18 units; the figure of 16 was arrived at from a hand check of students in several classes.
8. Average full-time staff load — Only staff teaching full-time in this department were considered. There are some faculty members who teach in other departments.

COMMERCE

Statistics — October, 1961 **Prepared by J. A. Crosse**

NOTE : This is a 5 year programme. Students complete 1st Year Arts before entering Commerce.

	Year	*1st & 2nd Years*	*3rd & 4th Years*	*Total Undergraduate*	*Graduate*
1.	Enrolment	1,202	2,325	3,527	68
2.	Student-hrs./wk.	3,606	3,834	7,440	106
3.	Aver. Student load	18	18	18	18
4.	Equiv. full-time students	200	213	413	6
5.	No. of courses	6	50	56	18
6.	No. of sections - lect.	11	55	66	18
	lab.	24	9	33	1
7.	Staff hrs./wk.	51	122	173	29.5
8.	Aver. full-time staff load	8.5	8.5	8.5	8.5
9.	Equiv. full-time staff	6	14.4	20.4	3.5
10.	Aver. Section size	109	41	63	3.8
11.	Student Staff ratio	33	14.7	20.2	1.7

Notes : (Numbers refer to row in table).

1. Special 300 series courses offered for other faculties have been included in 3rd and 4th year figures; the 300 level courses for graduate students only are included in graduate figures.

10. Average section size : Figures are for lectures only.

Special Considerations :

1. Many staff members have additional teaching loads in non-credit professional education courses. These are administered by the Faculty and cover more than 2,000 students.

2. The Faculty is divided into divisions (Accounting, Marketing, Industrial Administration, Finance, etc.). Comparison has not been made between divisions because of their smallness .

3. Senior undergraduates are used for marking and lab instructors.

NOTICE : *The June Meeting*

The annual general meeting of the C.A.U.T. for 1963 will be held at Laval University, Quebec, on 11-12 June.

The Canadian National Commission for UNESCO announces

THIRD NATIONAL CONFERENCE,
Chateau Laurier Hotel, Ottawa,
26 - 29 March, 1963.

Theme :

CANADA AND THE UNITED NATIONS
DEVELOPMENT DECADE

Speakers will include :

Mr. C. V. Narasimhan, Under Secretary for General Assembly Affairs, United Nations, New York.

Mr. René Maheu, Director-General, United Nations Educational, Scientific and Cultural Organization, Paris.

Mr. William Clark, Executive Director, Overseas Development Institute, London, England.

Mr. Frank Coffin, Deputy Administrator, Agency for International Development, Washington, D.C.

Mr. H. O. Moran, Director General, External Aid Office, Ottawa.

Further information and registration forms from :

The Conference Secretary,
Canadian National Commission for UNESCO,
140 Wellington Street, Ottawa 4, Ontario.

Correction : The following footnote to the article, "How Good are Our Canadian Universities ?" by F. H. Underhill, was omitted from page 9 of the September 1962 issue :

It should be added in fairness that the Dean of Women later gave me a list of the magazines for which the university authorities subscribe and which they place in the residence for the young ladies to read. The list included *Encounter* and *Canadian Art.* If only one young lady in the whole residence reads *Encounter,* or *Canadian Art* perhaps the place may yet be redeemed from damnation.

NOTICE OF APPLICATION FOR AFFILIATION: LOYOLA COLLEGE

The faculty association at Loyola College, Montreal, has applied for affiliation with the C.A.U.T. A committee to recommend what action Council should take on the application has been appointed; its chairman is Professor Eric Counsell (McGill). Anyone wishing to submit evidence or argument to the committee should do so through the Executive Secretary, 77 Metcalfe Street, Ottawa 4.

NOTICE OF POSITIONS VACANT*

University of Alberta, Edmonton.

The Department of Dairy Science

Invites applications for the position of Sessional Lecturer in Dairy and Food Technology from graduates or graduating students, particularly those who wish to continue their studies for the M.Sc. or Ph.D. degree.

The appointment which will be in the Department of Dairy Science will carry a salary of $5,060 for a period of 12 months. The duties for this period will involve lecturing and conducting laboratories for undergraduate students. These duties and preparation for them will probably occupy most of the appointee's time.

At the conclusion of the lecturing duties, the successful applicant would be free to undertake graduate work in the Department as a graduate teaching assistant. This change in status would involve a reduction in salary to $3,400 but only one-third (maximum) of the student's time would be involved in teaching. The successful applicant must be admissible to the Faculty of Graduate Studies.

Applications, together with transcripts, a recent photograph and the names of three referees known to the applicant, should be addressed to the Head, Department of Dairy Science, University of Alberta. It is hoped that an appointment can be made on or about 1 May 1963.

*The Bulletin carries these notices free of charge. Notice should be sent to the Executive Secretary, C.A.U.T., 77 Metcalfe Street, Ottawa 4.

Australian National University, Canberra, Australia.

The Faculty of Oriental Studies in the School of General Studies invites applications to the new Chair of Indonesian Languages and Literature. It is hoped that the appointee will be able to take up duty in 1963. The Professor will be Head of the Department of Indonesian and Malayan Languages and Literatures. He will be expected to be fluent in Bahasa Indonesia and fully competent in Javanese and at least one other Indonesian language. Preference will be given to a candidate who has worked in the historical field, with special reference to problems relating either to Islamic or Indonisian religion and culture. The salary for the post is £A4,250 per annum. Further information and the forms which should accompany an application may be obtained from the Registrar, School of General Studies, Australian National University, P.O. Box 197, Canberra City, A.C.T., Australia, with whom applications close on 25 March 1963.

Institute of Advanced Studies.

Department of Law of the Research School of Social Sciences

To commence as soon as possible.

An appointment as Fellow at a salary of not more than £A3,000 p.a. The Fellow will carry out legal research and will assist in supervision of post-graduate students. Particularly interested in applications from those wishing to work on one or more of following : torts, conflicts, property, comapnies and associations, labour relations, crime.

Further details from Box 4, G.P.O., Canberra, A.C.T.

Applications close 29th April, 1963.

Bishop's University, Lennoxville, Quebec.

Invites applications for appointments as Lecturers in the following Departments : Economics, Modern Languages, Physics, Political Science, Psychology.

The salary range at this rank is $5,500 - $6,500, plus various allowances, with beginning salaries dependent upon experience and qualifications. Appointments will date from 1 July 1963. Applications should be sent to the Head of the Department concerned.

Royal Botanical Gardens, Hamilton.

Applications are invited for a post of Botanist, involving cytotaxonomic studies on cultivated ornamental plants. Background in

genetics also desirable. Association of the Royal Botanical Gardens with McMaster University makes available additional research facilities and raises possibility of attracting graduate students in Taxonomy from there and other neighbouring seats of learning. Salary depending on qualifications and experience. Pension, hospitalization and medical benefits. Further details from the Director, Royal Botanical Gardens, Hamilton, Ontario.

Nova Scotia Technical College, Halifax.

The Department of Mechanical Engineering

Invite applications for an appointment as Associate or Assistant Professor. Desirable qualifications are Ph.D. or Master's degree in the general field of Applied Mechanics and some years of teaching experience. Teaching duties will consist of undergraduate courses in Machine Design and a graduate course in the general field of Mechanical Engineering.

Applications should be submitted to Prof. M. L. Baker, Box 1000, Halifax, N. S.

The Department of Mining and Metallurgy

Invites applications for an appointment as Associate Professor in Metallurgical Engineering. Desirable qualifications are a Ph.D. in Physical Metallurgy and some teaching or industrial experience. Teaching duties include undergraduate courses in Physical Metallurgy and a graduate course in the general field of Metallurgy.

Applications should be submitted to Prof. E. L. Cameron, Box 1000, Halifax, N.S.

Ontario Agricultural College, Guelph, Ontario.

Department of Zoology.

Entomologist : Ph.D. capable of directing research and graduate studies in economic entomology. Teaching experience an asset. The appointment will be at assistant or associate professor level. Salary ($6,900 - $10,500) will depend on qualifications.

Vertebrate Zoologist : Ph.D. with teaching ability and with research interests in population dynamics, ethology or experimental zoology. The appointment will be at assistant or associate professor level. Salary ($6,900 - $10,500) will depend on qualifications.

Applicants please send full particulars to :

Dr. W. E. Heming, Head, Department of Zoology,
Ontario Agricultural College, Guelph, Ontario, Canada.

The Canadian Peace Research Institute announces openings for social scientists, starting anytime after June 1963. Research interests are in area of disermament and its economic impact, arms control, foreign aid, ways of strengthening U.N., attitute and change studies. M.A. or Ph.D. The Institute is non-profit and non-political, with an inter-disciplinary and cross-cultural orientation. Salary dependent on training and experience. Possible to arrange for part-time teaching. Write : Director of Research, Canadian Peace Research Institute, 532 Waterluoo Street, London, Ontario.

University of Saskatchewan, Saskatoon.

The Department of Economics and Political Science invites applications for an assistant professor in each of political science and economics, to teach introductory and senior classes, and also for a senior appointment in economics with specialization in economic theory. The salary range for assistant professors is $7,000 - $8,800, for associate professors $9,000 - $11,800. Applications, with curriculum vitae including names and addresses of referees, should be sent to the Head of the Department.

Mechanical — Metallurgical Engineering. Assistant or Associate Professor to teach undergraduate and graduate materials science and metallurgy classes and to direct research in these areas. Excellent metallography laboratory. Facilities for metal working research with provisions for further diversification. Also vacancy for Assistant Professor for teaching and research in Applied Mechanics. Advanced degrees required for both posts. Applications with full particulars should be sent to Head, Department of Mechanical Engineering, University of Saskatchewan, Saskatoon, Sask., Canada.

School of Physical Education

Applications are invited for an instructress of Physical Education. The salary range is from $5,500 to $7,000, depending on the qualifications and experience of the applicant.

Inquiries should be addressed to :

Director, School of Physical Education,
University of Saskatchewan, Saskatoon, Saskatchewan.

Sir George Williams University, Montreal.

The Department of Engineering invites applications for an appointment in Civil or Mechanical Engineering, with specialization in Fluid Mechanics. Successful applicant expected to take part in

developing curriculum and plant for a new degree programme, with particular responsibility for hydraulics laboratory planning. Master's degree minimum requirement; Ph.D. preferred. Rank dependent upon qualifications. Write to Jack Bordan, Chairman, Department of Engineering, Sir George Williams University, Montreal 25.

Waterloo Lutheran University, Waterloo, Ontario.

Additions have been authorized for the 1963-64 Term in the following departments. Minimum salaries are : Lecturer, $5,500; Assistant, $7,000; Associate, $8,700; Professor, $10,300. Applications with curriculum vitae and names of referees to be sent to Dr. L. H. Schaus, Dean, Waterloo University College, Waterloo Lutheran University.

Department of Biology

Associate or Assistant Professor, Ph.D. preferred, with specialization in Botany.

Department of Business Administration

Assistant Professor to teach introductory, intermediate, and administrative Accounting; C. A. and Ph.D., or Ph.D. in progress, required.

Department of Economics

Two Assistant Professor or Lecturers, one to teach various courses in Economic History, the other to teach Economic Principles and supervise seminars; M.A. or Ph.D. required.

Department of English

Two junior Instructors, Assistant or Lecturer rank, with M.A. or Ph.D.

Department of German

Associate Professor, Ph.D. and teaching experience preferred; with specialization in phonetics and Germanic philology.

Department of History

Associate or Assistant Professor to teach Modern European and Commonwealth History; Ph.D. preferred.

Department of Mathematics

Associate Professor to teach senior undergraduate mathematics; possibility of assuming chairmanship; Ph.D. is essential.

Department of Philosophy

Assistant Professor or Lecturer to teach analytical philosophy and logic; Ph.D. or partial fulfillment of doctorate required.

Department of Physics

Associate or Assistant Professor to organize undergraduate program with possibility of assuming chairmanship of department.

Department of Political Science

Assistant Professor or Lecturer to teach political theory, public administration and U.S. Government; Ph.D. preferred; M.P.A. also acceptable.

Department of Psychology

Assistant Professor to teach clinical or developmental psychology; Ph.D. preferred.

Department of Romance Languages

Two positions for men, Assistant Professor rank, Ph.D. preferred; one in literary and linguistic French; other in French and Spanish.

NOTICE OF PERSONS AVAILABLE FOR APPOINTMENT*

Policital Science. Male, single, 29. Honours B.A., D.P.A., M.A. (Public Administration); Ph.D. in progress. Areas of special interest: Comparative Government, International Affairs, Public Administration. Inquiries to Box No. 7, C.A.U.T. National Office, 77 Metcalfe Street, Ottawa 4.

Zoologist, with research experience in behaviour and ecology of aquatic animals (marine and freshwater) through 5 years in the arctic and 6 years post-doctoral work in a government laboratory, is seeking a university appointment. Married, age 32, graduate of Edinburgh and McGill Universities. Inquiries to Box No. 8, C.A.U.T. National Office, 77 Metcalfe Street, Ottawa 4.

Mathematics and/or Statistics. Male, 34; M.Sc., work towards Ph.D. over except thesis : from an Asian country; 4 years of university teaching experience in U.S.A. Similar experience of university teaching in Asian universities, at all levels. Theory of Statistics, Calculus, Differential Equations, Algebra etc. Also some research experience in U.S. Govt. agency; and in U.S. Industry. Inquiries to Box No. 9, C.A.U.T. National Office, 77 Metcalfe Street, Ottawa 4.

*Notices should be sent to the Executive Secretary, C.A.U.T., 77 Metcalfe Street, Ottawa 4.

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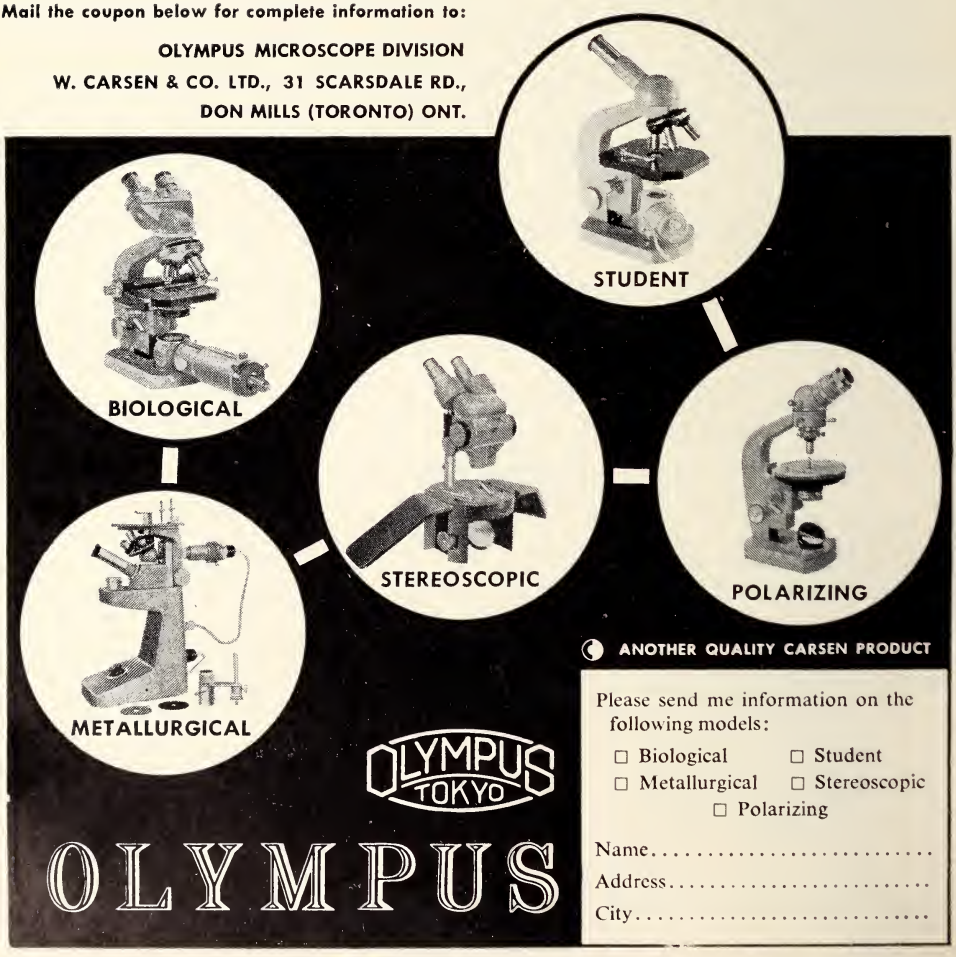

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